

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BOARD OF PATENT APPEALS AND INTERFERENCES**

In Re Application of:

Martin, et al.

Group Art Unit: 1763

App. No.: 10/784,697

Examiner: Maureen G. Arancibia

Filed: February 23, 2004

Confirmation No. 1334

Docket No.: 62002-1752

For: **METHOD AND APPARATUS FOR LOW ENERGY ELECTRON ENHANCED  
ETCHING OF SUBSTRATES IN AN AC OR DC PLASMA ENVIRONMENT**

**REPLY BRIEF UNDER 37 C.F.R 41.41**

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Sir:

This is a Reply Brief in response to the Examiner's Answer dated June 28, 2007.

## **I. STATUS OF THE CLAIMS**

Claims 1-2, 4-7, 9-11, and 16-26 remain pending in the present application. The Examiner's Answer maintains the rejections of the claims and generally repeats the arguments advanced during prosecution of this application along with providing comments to the Appeal Brief (in the Response to Argument Section, pages 15-18 of the Examiner's Answer), filed on December 15, 2006. With regard to the substantive remarks of the Examiner's Answer, Appellants disagree. Appellants will address some issues raised in the Examiner's Answer. Appellants continue to repeat, re-allege, and incorporate by reference the positions and arguments set forth in the Appeal Brief.

## **II. ARGUMENTS**

The Examiner's Answer provides the following rebuttal comments, beginning on page 15 (emphasis added), and set forth below in relevant part:

In regards to Applicant's arguments against the §103 rejections of Claims 1, 2, 4-7, 9-11, and 16-26, the Examiner responds that the rejection over the cited references is not based on the *structural capability* of the apparatus taught by the combination of Hayashi et al. with Lee and/or Kofuji et al. to perform the recited intended use of low-damage anisotropic electron dry etching, including the recited intended use of the pulse waveform power sources coupled to the mechanical support and/or the additional structure in order to direct electrons from the plasma to the substrate with sufficient energy to etch material from the substrate. As discussed above, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. The Examiner notes that the functional limitations of the claims have not been disregarded, as asserted by Applicant, but rather have been fully considered, and determined to *not* result in a structural difference between the claimed invention and the cited prior art. The Examiner maintains that a proper standard for patentability has been applied...The Examiner has provided a technical basis for asserting that the structure of the apparatus taught by the combination of the cited references would be structurally capable of performing the functional limitations recited in the claims (not, as asserted by Applicant, that the apparatus must be somehow further modified to perform the functional limitations recited in the claims).

Appellants respectfully disagree. It is unclear given the inconsistency of arguments underscored above whether the Examiner treats the limitations as "intended use" or "functional language." Appellants have set forth their belief that the limitations are functional.

Further, Appellants respectfully submit that the limitation of “a pulse waveform power source adapted to electrically bias the additional structure to direct the electrons from the plasma towards the substrate, the bias providing sufficient energy for the electrons to etch material from the substrate” clearly requires a pulse waveform power source equipped to provide a bias with sufficient energy for electrons to etch material. In other words, the bias provided by the pulse waveform power source is not of just any magnitude or waveform, but instead, is one that is sufficient to cause electrons to etch material from the substrate. This limitation is not immaterial to the structure or function of the pulse waveform power source, and to treat otherwise would be to improperly consider such a structure equivalent to a pulse waveform power source that is incapable of generating a bias for providing sufficient energy for electrons to etch material. As set forth in the Appeal Brief on pages 8-9, the pulse waveform power source that provides such a bias as claimed does so with the benefit of specialized waveforms and voltages that are not trivial, but instead requires significant modification to the systems described in Hayashi and Lee (and not merely a change in voltage setting as alleged on page 4 of the Examiner’s Answer).

Further, Appellants again reiterate that **there is absolutely no disclosure or teaching of electron etching anywhere in any of the references**. Hence, the Examiner’s assertion that the systems of the art of record are capable of performing the functional limitations is mere speculation, not grounded in any factual basis existing in the art of record. That is, there is no disclosure in the art of record revealing how to cause electron etching. Equally relevant, is what one having ordinary skill in the art is equipped with (or rather, deprived of), based on Hayashi and Lee, as to any teaching about electron etching. As set forth in the Appeal Brief, there is no such teachings in Lee and Hayashi.

Additionally, Appellants note that independent claim 16 has been lumped into the rebuttal arguments beginning on page 15 of the Examiner’s Answer. Of course, Appellants note that the means plus function language of the claim renders the rebuttal arguments set forth therein (e.g., discussion of being “capable”) irrelevant since the Examiner must show that the function is performed in the art of record, which cannot be shown because there is no disclosure or teaching of etching material with electrons.

With regard to the rebuttal arguments beginning on page 16, reproduced below in relevant part as follows:

In response to Applicant's argument that the claimed invention is for "electron dry etching" and "electron enhanced etching," while each of Hayashi et al., Lee, and Kofugi et al. is concerned with ion etching, and that the teachings of Lee are not applicable, since Lee teaches that electrons are confined in the plasma rather than used to etch the substrate, the Examiner argues that the apparatus taught by the cited combinations of Hayashi et al., Lee, and Kofugi et al. meets the structural limitations of the claimed invention and would be structurally capable of performing the intended use of electron etching, based on the technical reasoning set forth above. The Examiner argues that the fact that Applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

The Examiner particularly notes in regards to point (1) set forth by Applicant on Page 9 of the Appeal Brief (and similar assertions elsewhere in the Appeal Brief), that the statement in the Office Action that the power sources of the apparatus taught by the cited combination of references are capable of being "adapted to provide a desired amount of energy to the electrons in the plasma" does not mean that the apparatus taught by the cited combination of references must be somehow further modified to meet the claims...

Appellants appreciate the Examiner's clarification of use of the term "adapted," although Appellants do respectfully note that other points were expressed on page 9 of the Appeal Brief, not addressed in the Examiner's Answer, supporting the assertion that the Office Action's recognition for the need for modification of the systems/apparatus.

As to the point above regarding obviousness of differences, Appellants wish to clarify that the points expressed by Appellants in the referenced Appellants arguments include that (1) the art of record discloses nothing about electron etching, and (2) that at least in the system described in Lee, it appears that any impingement of electrons in the substrate is something to be discouraged, which of course runs contrary to any teaching for electron etching. Further, as to the second point, Appellants wish to correct the record that the teaching of confinement of electrons to the plasma is found in Lee in column 9, lines 1-7, not column 9, line 16 as erroneously (without deceptive intent) set forth in the Appeal Brief.

With regard to the Examiner's assertion as to the 35 USC 112, second paragraph issue (page 18), Appellants stand by their previous assertion on pages 15 and 16 of the Appeal Brief, and believe no further elaboration is needed.

### **III. CONCLUSION**

Based upon the foregoing discussion, the Appellants respectfully request that the Examiner's final rejection of claims 1-2, 4-7, 9-11, and 16-26 be overruled and withdrawn by the Board, and that the application be allowed to issue as a patent with all pending claims.

No additional fee is believed to be due. However, any additional fee that may be due or required is authorized to be charged to deposit account no. 20-0778.

Respectfully submitted,

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**David Rodack**  
**Registration No. 47,034**